**MCC. 3.MD.5 (Area)**

Recognize area as an attribute of plane figures and understand concepts of area measurement.

a. A square with side length 1 unit, called “a unit square,” is said to have “one square unit” of area, and can be used to measure area.

b. A plane figure which can be covered without gaps or overlaps by n unit squares is said to have an area of *n* square units.

**ENDURING UNDERSTANDINGS**

● Area models are related to addition and multiplication.

● Area covers a certain amount of space using square units.

● When finding the area of a rectangle, the dimensions represent the factors in a multiplication problem.

● Area models of rectangles and squares are directly related to the commutative property of multiplication.

● Rearranging an area such as 24 sq. units based on its dimensions or factors does NOT change the amount of area being covered (Van de Walle, pg 234). Ex. A 3 x 8 is the same area as a 4 x 6, 2 x12, and a 1 x 24.

● Area in measurement is equivalent to the product in multiplication.

● Area models can be used as a strategy for solving multiplication problems.

**ESSENTIAL QUESTIONS**

● Can the same area measurement produce different size rectangles? (Ex. 24 sq.units can produce a rectangle that is a 3 X 8, 4 X 6, 1 X24, 2 X 12)

● Do different factors with the same area cover the same amount of space? (Ex. Is a 3 X8 the same area as a 1 X 24?)

● How can area be determined without counting each square?

● How can multiplication and addition be used to determine a rectangle’s area?

● How can the same area measure produce rectangles with different dimensions? (Ex. 24 square units can produce a rectangle that is a 3 x 8, 4 x 6, 1 x 24, 2 x 12)

● How do different dimensions resulting in the same area cover the same amount of space? (Ex. Is a 3 X8 the same area as a 1 X 24?)

● How do rectangle dimensions impact the area of the rectangle?

● How does knowing the area of a square or rectangle relate to knowing different multiplication facts?

● How does knowing the area of a square or rectangle relate to knowing multiplication facts?

● How does knowing the dimensions of a rectangle relate to area?

● How does knowing the dimensions of a rectangle relate to multiplication?

● How does knowing the length and width of a rectangle relate to multiplication?

● How does the length and width (factors) impact the area of the rectangle?

● How is the commutative property of multiplication evident in an area model?

● What is area?

● What is the connection between area models and skip counting?

● What is tiling?

● Why are square units commonly associated with finding area?

● Why is an area model a representation for multiplication?

● Why is it important to not have gaps or overlaps when determining the area of a figure?

**CONCEPTS/SKILLS TO MAINTAIN**

It is expected that students will have prior knowledge/experience related to the concepts and skills identified below. It may be necessary to pre-assess in order to determine if time needs to be spent on conceptual activities that help students develop a deeper understanding of these ideas.

● Addition, Subtraction, Multiplication, Division

● Skip counting

● Relationship between addition and multiplication

● Two-dimensional plane figures

● Understanding of arrays

● Solving one-step word problems

● Factors of products

● Commutative Property of Multiplication

● Distributive Property of Multiplication

**STRATEGIES FOR TEACHING AND LEARNING**

**Geometric measurement – understand concepts of area and relate area to multiplication and to addition.**

Students can cover rectangular shapes with tiles and count the number of units (tiles) to begin developing the idea that area is a measure of covering. Area describes the size of an object that is two-dimensional. **The formulas should not be introduced before students discover the meaning of area.**

The area of a rectangle can be determined by having students lay out unit squares and count how many square units it takes to completely cover the rectangle completely without overlaps or gaps. Students need to develop the meaning for computing the area of a rectangle. A connection needs to be made between the number of squares it takes to cover the rectangle and the dimensions of the rectangle. Ask questions such as:

● What does the length of a rectangle describe about the squares covering it?

● What does the width of a rectangle describe about the squares covering it?

The concept of multiplication can be related to the area of rectangles using arrays. Students need to discover that the length of one dimension of a rectangle tells how many squares are in each row of an array and the length of the other dimension of the rectangle tells how many squares are in each column. Ask questions about the dimensions if students do not make these discoveries. For example:

● How do the squares covering a rectangle compare to an array?

● How is multiplication used to count the number of objects in an array?

Students should also make the connection of the area of a rectangle to the area model used to represent multiplication. This connection justifies the formula for the area of a rectangle.

Provide students with the area of a rectangle (i.e., 42 square inches) and have them determine possible lengths and widths of the rectangle. Expect different lengths and widths such as 6 inches by 7 inches, or 3 inches by 14 inches.

**EVIDENCE OF LEARNING**

By the conclusion of this unit, students should be able to demonstrate the following competencies:

● Understand that area means to cover a certain amount of space without gaps.

● Discuss and demonstrate the relationship between area and multiplication.

● Discuss and demonstrate how area is repeated addition based on a rectangle’s two dimensions or factors.

● Understand the decomposition of an area model through multiplication and addition.

● Create different area models with the same area by using different dimensions or factors.

● Relate area to the commutative, identity, and distributive properties of multiplication.

**LEARNZILLION:**

<https://learnzillion.com/lessonsets/106-understand-area-as-an-attribute-of-plane-figures-and-concepts-of-area-measurement>